

SOIL FERTILITY MANAGEMENT IN RICE BASED CROPPING SYSTEM

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Among the food crops in India, rice is the major cereal crop occupies in an area of 42 m.ha and contributes 80 to 90 mt of production. There are about 136 rice based cropping systems are being followed in different zones of India. The predominant cropping systems are as follows:

- Rice-Wheat system
- Rice-Rice system
- Rice- Maize / Bengal gram system
- Rice-Jute / Potato system
- Rice-Jute-Rice
- Rice-Rice-Pulses
- Rice-Sugarcane system

Soil fertility management: Intensive rice cropping through the use of short duration and high yielding varieties coupled with increased use of inorganic fertilizers and improved irrigation management practices have resulted in enhanced crop productivity.

This productivity enhancement gradually replaced organic sources of nutrients leading to deficiency of micronutrients, which reduce productivity of crops over the years. To overcome

these problems, organic manures should be applied in combination with inorganic fertilizers which will improve fertility status of soil resulting in higher productivity of crops.

Legumes and soil fertility: Inclusion of legumes like cowpea and black gram during pre-rice summer season in rice-rice-green gram cropping system yielded 5 to 7 q/ha of grain yield. Incorporation of cowpea and black gram haulms enhanced rice yield by 10.4 and 7.5%, respectively. This incorporation helped in saving fertilizer N to an extent of 30-50 kg and 20-30 kg N/ha, respectively.

Green manures and soil fertility: Experiments conducted in India revealed that growing of green manure crops preceding to rice in rice-rice-pulse cropping system, registered a grain yield similar to application of 50 kg N/ha. This was due to improved soil fertility through the incorporation of green manures. The fertilizer N equivalent of green manure on rice was 38 kg/ha during North East

monsoon season and 47 kg/ha during South West monsoon season. The N equivalent was 20% higher than urea for *Crotalaria juncea* (sunhemp) and 15% for *Sesbania aculeata* (daincha).

Influence of organic manures and inorganic fertilizers on soil fertility: Increase in cropping intensity demand more nutrients to sustain high productivity. A single lowland rice crop producing 9.8 t grains ha⁻¹ and 8.2 t straw ha⁻¹ in about 115 days removed up to 218 kg of N, 31 kg of organic P, 258 kg of K and 9 kg of S ha⁻¹. Besides these the other micro nutrients removed by the crop must be replenished to sustain high production. Hence, application of organic and inorganic sources of nutrients

is highly essential for improving soil fertility thus leading to sustainable production. Based on the aforementioned research findings, the following recommendation should be adopted for achieving sustainable production.

- For rice – wheat cropping system, N should be applied to both rice and wheat, P only to wheat and K and Zn to rice.

- For rice – rice - green gram / soybean system, N should be applied to both the crops (rice), P to dry rice and K, S, and Zn to second crop (rice).

- In rainfed rice-pulse system, fertilizer should be applied to rice alone. If moisture is adequate, apply 20 kg P₂O₅/ha to pulses.

Inclusion of legumes in the cropping systems and application of blue green algae / azolla in rice contribute 20 – 40 kg N/ha.

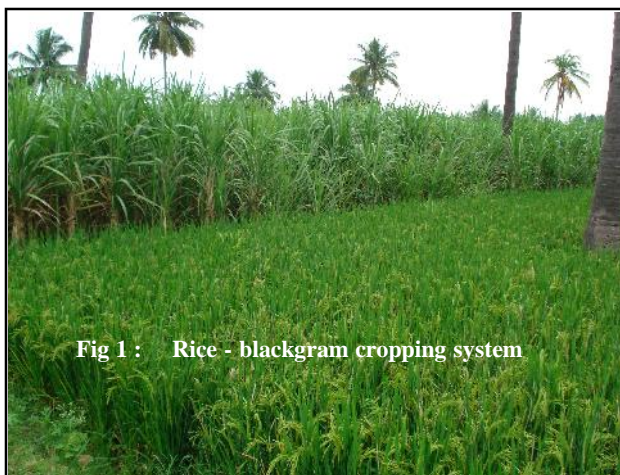


Fig 1 : Rice - blackgram cropping system

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